

charge followed the same rule. We believe that the motive power for the descent was gravity, as in the case of any ordinary avalanche.

The accepted mechanism of a volcanic eruption is that a molten magma rises in the volcano chimney. It consists of fusible silicates and other more or less refractory minerals, sometimes already partly crystallised, and the whole highly charged with water and gases, which are kept in a liquid state by the immense pressure to which they are subjected. When the mass rises nearer the surface and the pressure is diminished, the water and gases expand into vapour and blow a certain portion of the heavier and less fusible materials to powder, or, short of this, form pumice stone, which is really solidified froth, and they are violently discharged from the crater. When the greater part of the steam and gases have been discharged, the lava, still rising, gets vent either over the lip of the crater or often through a lateral fissure, and flows quietly down the side of the mountain.

It is quite recognised that these phenomena may occur in various relative proportions. We believe that in these Pelean eruptions, the lava which rises in the chimney is charged with steam and gases, which explode as usual, but some of the explosions happen to have only just sufficient force to blow the mass to atoms and lift the greater part of it over the lip of the crater without distributing the whole widely in the air. The mixture of solid particles and incandescent gas behaves like a heavy liquid, and before the solid particles have time to subside, the whole rolls down the side of the mountain under the influence of gravity, and consequently gathers speed and momentum as it goes. The heavy solid particles are gradually deposited, and the remaining steam and gases, thus relieved of their burden, are free to ascend.

The effect of avalanches in compressing the air before them and setting up a powerful blast, the effects of which extend beyond the area covered by the fallen material, has long been recognised. A group of large trees was overthrown by the blast of the great avalanche from the Attels on the Gemmi pass in 1895; all lay prostrate in directions radiating away from the place where the avalanche came down.

#### THE ZOOLOGICAL SOCIETY'S MEETING.

THE monthly meeting of the Zoological Society of London, at their house in Hanover Square, held on January 22, was well attended, it being expected that some account of the operations of the committee of reorganisation recently appointed by the council, on the occasion of the change in the secretaryship, would be given. The chair was taken by His Grace the Duke of Bedford, K.G., the president, at 4 p.m., and the new secretary, Mr. W. L. Sclater (lately director of the South African Museum, Cape Town), was present for the first time. After the election of new fellows and other routine business, the report of the council was read by the secretary. It stated that thirty additions had been made to the Society's menagerie during the month of December last, amongst which was a very fine pair of the one-wattled cassowary (*Casuarus uniappendiculatus*), deposited by the Hon. Walter Rothschild, M.P. The report also stated that the total income of the Society in 1902 had been 29,077*l.*, being, in spite of the bad weather that had prevailed during the summer, only 273*l.* less than the receipts of the previous year, and being the sixth largest annual income ever received by the Society. The report of the reorganisation committee was then read to the meeting by Sir Harry Johnston, K.C.B., the hon. secretary of the committee. It was divided into numerous heads relating to every branch of the Society's affairs, and containing recommendations thereon. Many of these were of a technical character, but important changes were advised under the heads of the gardens and menagerie, the prosectorium, the staff at Hanover Square and the secretaryship. The charge of the Society's gardens and menagerie was proposed to be entrusted to a member of the council, Mr. W. E. de Winton. Mr. de Winton would thus, for the present, take the place of Mr. Clarence Bartlett, who has retired on account of bad health on a pension. This appointment being for a year only would give time for the selection of a new superintendent, who must possess special qualifications such as were not easily to be found. Various buildings, such as the giraffe house, the small mammals' house and the bears' dens, were pointed out as specially requiring reconstruction, and there should be a new

seals' pond and better accommodation for the polar bears. Alterations were also recommended at the monkey and antelope houses and in other buildings. A foreman keeper should be appointed to make periodical tours of inspection in the gardens during the day, and the keepers should be forbidden to accept gratuities, to trade in living animals or to keep them without the sanction of the authorities. The prosectorium should be carried on by the present officer in charge (Mr. F. E. Beddard, F.R.S.), but on lines to be laid down by a scientific committee, so that the work should have a more definite object. The prosector should also have a veterinary assistant, who would help in the *post-mortems* and look after the health of the animals in the menagerie. The salary of the new secretary would begin at 600*l.* a year, and his work would be under the supervision of various committees, of all of which the president would be an *ex officio* member. These committees were to be directly responsible to the council. The garden-guide, which the council had formerly granted to the secretary as part of his emolument, had now reverted to the Society, and would be improved and carried on for their benefit.

After the report had been read, the recommendations based upon it and adopted by the council were read from the chair by the president, and it was agreed that they should be printed and sent to the fellows. Notice of a motion was then given by Mr. A. G. Ross that copies of the testimonials tendered to the council by Mr. W. L. Sclater, the newly elected secretary, and by Dr. Chalmers Mitchell (one of the unsuccessful candidates) should be printed and sent to all the fellows. This motion was ordered to be discussed at the next general meeting on February 19.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

At Bedford College on Thursday, February 5, a lecture on "Electricity and Matter" will be given by Sir Oliver Lodge.

The first two scholarships at Oxford granted under the terms of Mr. Rhodes's will have just been awarded by the Government of Rhodesia to two students of the Jesuit College in Bulawayo.

The award of valuable scholarships by private institutions deserves encouragement. We are glad, therefore, to notice that as a result of the recent scholarship examinations, the board of control of the Electrical Standardising, Testing and Training Institution has made the following awards:—To W. H. C. Prideaux, of Shrewsbury School, a Faraday scholarship, value eighty guineas, tenable for two years; to N. S. Smith, of Wellingborough School, an exhibition, value thirty guineas, tenable for two years; to W. d'Arcy Madden, of Haileybury College, and to Frederick Smith, of Aldenham College, special prizes of ten guineas each.

It is understood that the Carnegie Trust will shortly take active steps to encourage post-graduate research. The present idea is that with the assistance of the Trust, students, after graduating, will be enabled to prosecute thoroughly their particular branches of study. Mr. Carnegie is reported not to consider suitable the post-graduate organisation of Oxford and Cambridge. His scheme will provide no substantial livings. The amount of fellowships, while ample for adequate study, will not be so large as to induce the possessors to cling to them for a livelihood, and, moreover, the fellows will be selected and not ascertained by competition. The fellowships will be directed mainly into the channels of scientific research. Graduates desiring to become fellows will be required to state the class of research they wish to pursue.

The annual meeting of the Mathematical Association was held on January 24, Prof. A. Lodge in the chair. The report of the committee appointed by the Association to consider the subject of the teaching of elementary mathematics, to which reference has already been made in these columns, was referred to in the council's report for the past year. Prof. Forsyth was elected president for the forthcoming year, and Mr. A. W. Siddons submitted the report of the committee on the teaching of elementary mathematics, which, he said, had been criticised as very conservative. The most immediate need was that the preparatory schools should move in the matter, and they should get the head-masters of such schools to adopt a more modern treatment of mathematics. It would not be done in the public schools unless the boys were taught from the beginning.

In a short discussion which followed, Prof. Forsyth said it was desirable that they should not hurry changes. It did not lie with the public schools or the preparatory schools to make changes. There was a vast body of teachers in the small schools, but the great difficulty was to get at such teachers and induce them to adopt new methods. The report was adopted.

AMONG the many interesting papers read at the conference of the Froebel Society and the Child-Study Association on Saturday was one by Dr. W. B. Drummond, of Edinburgh, who dwelt upon the preparation for child-study as a piece of proper scientific investigation carried on according to modern methods. He laid down that a course of training in biology, that is to say, in the practical study of plants and animals, was the first essential to success. His reason was that the observations made on children are in reality part of biology. Next a course of psychology should follow, and then one in methods of education, for many of these have been based upon an intimate acquaintance with the ways and needs of children. He pointed out how advantage was taken of the peculiarities of the child mind in the Bible, and instanced the setting up of the twelve stones from Jordan so that when they had aroused the curiosity of the children, and this had been satisfied, the monument would always be a reminder to them of the crossing of Jordan as on dry land. The educational results of many celebrations, customs and games which we are ourselves familiar with were touched upon, though it was pointed out that these were not always intentional at the beginning. The danger was pointed out of asking children ill-considered questions which might excite their imagination in a way detrimental to them, or which by suggesting an answer or confusing the young persons might defeat the object of the experiment. During the course of the paper, the characteristics of primeval man were touched upon, as indeed they had been previously during the conference, and in the concluding discussion, Mr. Lewis Paton, head-master of University College School, expressed the opinion that much light could be thrown upon the ways of boys by a study of savages. Another and possibly more serious point was that he found by the time his pupils had reached the age of nine and came to him, their characters were formed or more often deformed, and this is a very strong argument for the advancement of child-study.

AN article by Sir William Ramsay, in the January number of *East and West*, deals with the recent Report of the Indian Universities Commission, and contains several suggestions which ought to be read by all who are interested in the aims and character of university education. The commissioners had not the courage of their convictions, for after forming an accurate conception of the function of a university, they refused to act upon it and accepted old ideals as offering the path of least resistance for the universities of India to follow. As regards the government of the universities, Sir William Ramsay shows that the commissioners could have found abundant precedent for a recommendation that a small number of persons, not exceeding ten, should have been given control of the funds of the university, leaving to the teachers—that is, heads of departments—the entire management of academical affairs. The large number of colleges—many of them really secondary schools—in so-called affiliation with Indian universities presents a difficulty, but the suggestion is put forward that it could be overcome by making the B.A. and B.Sc. degrees, or the former only, equivalent to leaving examination for secondary schools. Students who wished to pursue their studies would do so at the universities. There would thus be a separation of the college from the university, as in the United States, where numerous colleges give the degrees of A.B. and S.B., and the students afterwards proceed to such places of post-graduate study as the Johns Hopkins University or the university side of Harvard. Some American universities have both college and university sides, but the students in the latter are those proceeding to higher degrees. As to the objection that unless external examiners are called in the examination for degrees by colleges could not be contemplated, Sir William Ramsay urges that the teacher ought to be trusted to gauge the capacity of his students, though it would be advisable for him to act in conjunction with an external examiner for all the colleges to secure uniformity of standard. Finally, he remarks:—"The true prosperity and success of colleges and of universities in training men for their later careers, and in creating and disseminating knowledge, depend on the observance of two fundamental maxims:—First,

choose for professors men who have made some reputation and are engaged in active prosecution of research; second, give such men a wide liberty in dealing with their subjects and with their students. Where these maxims have been acted on, university education has been a conspicuous success, and the creation and progress of knowledge have been maintained. May India see fit to adopt and practise these maxims."

## SCIENTIFIC SERIALS.

*American Journal of Science*, January.—The morphogenesis of Platystrophia. A study of the evolution of a Palæozoic brachiopod, by E. R. Cumings.—On ruling concave gratings, by W. Rollins. It has been shown that the Rowland concave gratings give false spectral lines so sharp and clear that there is probability and some evidence that they have been mistaken for real lines. The cause of this is examined, and suggestions are made for a new design of ruling machine in which these defects are overcome. The machine has not yet been constructed.—The variations of potential along a wire transmitting electric waves, by C. A. Chant.—Rickardite, a new mineral, by W. E. Ford. The mineral occurs in the Good Hope mine at Vulcan, Colorado, and consists of a nearly pure copper telluride,  $\text{Cu}_4\text{Te}_3$ .—On the occurrence of free phosphorus in the Saline Township meteorite, by Oliver C. Farrington. The phosphorus was noticed on drilling a hole into the meteorite for the purpose of breaking off a piece, and was proved to exist in the free state by its smell, luminosity, action on silver nitrate and conversion into ammonium phosphomolybdate.

*Bulletin of the American Mathematical Society* (2), ix., No. 3 (December, 1902).—W. B. Fite, commutator subgroups of groups whose orders are powers of primes.—L. I. Hewes, note on irregular determinants.—G. O. James, on the projections of the absolute accelerations in relative motion.—E. P. Eisenhart, on infinitesimal deformation of the skew helicoid.—S. Epoteen, on integrability by quadratures.—E. B. Wilson, account of the Abel centenary.—Reviews: English and French translations of Hilbert's "Grundlagen der Geometrie" (E. R. Hedrick); Dickson's "Linear Groups" (G. A. Miller); Buckingham's "Thermodynamics" (E. H. Hall).—No. 4 (January, 1903).—F. Cajori, on series whose product is absolutely convergent.—L. E. Dickson, on the abstract simple groups of orders 504 and 660.—C. M. Mason, account of the Carlsbad meeting of the Deutsche Mathematiker-Vereinigung.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Anthropological Institute**, January 13.—Dr. A. C. Haddon, F.R.S., in the chair.—Dr. C. S. Myers read a paper on the future of anthropometry. He suggested that the work in which anthropometry had hitherto been concerned, viz. the determination of the average metric differences between the various peoples of the world, must ultimately yield before improved methods and new problems. The frequency-distribution of any one character in a series of individuals must be studied with greater accuracy. The mean of the deviations of individuals from the mean of the whole series and the form of the binomial frequency-curve require to be determined both for relatively pure and mixed peoples. Frequency-curves will almost invariably show more than one point of maximal frequency. But before the usual inference is drawn that these several peaks represent heterogeneous elements in the series, care must be taken that the irregularities of distribution are not the result of examining an insufficient number of individuals. The future will see the precise investigation of the degree of correlation of various characters, the mode of inheritance of characters, the fertility and characters of cross-breeds, and the effect of migration and evolution on mankind. Mr. Francis Galton, Prof. Karl Pearson and others have already made a start. Anthropometry has first to look for aid to the infant science of biometry, which can employ experimental and therefore simpler conditions. The whole study of natural history is passing from the descriptive to the quantitative aspect. In this, physical anthropology must join.